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Changes in Knowledge and Beliefs About Human Papillomavirus and Cervical Cancer Screening Intervals in Low-Income Women After an Educational Intervention

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Abstract

Introduction—Women have been reluctant to adopt longer than annual intervals for cervical cancer screening, despite guidelines recommending screening every 3 to 5 years. Our study assessed patient knowledge and beliefs about human papillomavirus (HPV) and cervical cancer screening after exposure to an educational intervention, and whether there was a change in time regarding knowledge and beliefs among all study participants in an underserved population.

Method—The study was conducted in 15 clinics associated with 6 Federally Qualified Health Centers in Illinois, USA. Cervical cancer screening patients (n = 644) completed a baseline and postintervention follow-up survey. The intervention included an HPV test and an educational pamphlet. Significance testing of changes in knowledge and beliefs was conducted with multilevel, mixed-effects models adjusting for repeated measures of patients and clustering within clinics.

Results—No significant differences in study outcomes were found between the intervention and control groups. Among all women, knowledge of HPV significantly improved over time. At follow-up, fewer women reported that having a co-test is good, wise, will give you peace of mind, will tell you whether you need to worry if Pap is abnormal, is something your doctor thinks you should have, and will give you the best care available. More women said it would be bad, useless, or worrying to wait 3 years for a Pap test at follow-up.

Conclusion—HPV knowledge improved over time, but the educational intervention utilized in this study was not successful in improving attitudes and beliefs about co-testing and longer screening intervals, and beliefs about HPV co-testing and 3-year screening intervals were less favorable. Having health care providers discuss the consequences of overscreening and the natural history of HPV and cervical cancer with their patients may help increase adherence to longer screening intervals. Further examination of the essential components for educational intervention in this population is warranted.

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Declaration of Conflicting Interests

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Keywords

cervical cancer; medically underserved; HPV; cancer screening; FQHC

Introduction

Cervical cancer screening with the Papanicolaou (Pap) test has been the bedrock of women's annual primary care services for decades. Current cervical cancer screening guidelines recommend longer screening intervals; women aged 30 to 65 years should have a Pap test every 3 years or a human papillomavirus (HPV) co-test (Pap and HPV test) every 5 years.[1–3] Some women, particularly those without an usual source of care or insurance[4] are screened less often than recommended, which can lead to more disease.[5] However, many women in the United States are screened too frequently; health care providers and patients have been slow to accept guidelines that recommend longer than annual intervals between screenings, and women, including those who are low-income, are often screened annually.[6–9] For patients in particular, lack of knowledge about cervical cancer screening,[6] HPV[10] and the relation to cervical cancer,[11] a desire for more frequent care, a higher degree of perceived risk of cervical cancer,[12] and skepticism about cost as the motivation for the guidelines have been identified as barriers to extending screening intervals.[9] Additionally, guidelines for cervical cancer screening have been revised twice in the past 6 years (2009 and 2012), and these changes may be partially responsible for the resistance to changing screening practices. Guidelines are likely to continue to evolve, including the option of HPV testing as a primary screening approach.[13]

The Centers for Disease Control and Prevention (CDC) launched the CDC Cervical Cancer (Cx3) Study, a multicomponent educational intervention designed to increase the willingness of health care providers and their medically underserved patients to extend routine cervical cancer screening intervals and decrease excessive screening.[14] The primary purpose of this analysis was to assess whether the educational intervention resulted in changes in patients' knowledge and beliefs about HPV and cervical cancer screening. We also examined whether there was a change in knowledge and beliefs about HPV and cervical cancer screening among all study participants over time.

Method

Study Design

The Cx3 Study was conducted in 15 clinics associated with 6 Federally Qualified Health Centers (FQHCs) in Illinois, USA.[14] All clinics were enrolled in the study by August 2009. CDC selected FQHCs as the study site because clients are predominately low-income and underinsured or uninsured. Assessing practices in this settings will help CDC provide technical assistance to national cancer programs.

Each clinic was assigned to 1 of 2 study groups: intervention (n = 7) or control (n = 8). All clinics received HPV tests to be used with the Pap test for cervical cancer screening. Clinics in the intervention group received a multicomponent educational program that included

educational materials for providers and patients that were designed for this study. For the patient participating in the intervention, a 22-page pamphlet and a bookmark promoting the HPV co-test and the longer screening interval were developed in English and Spanish. The pamphlet was written at a sixth grade reading level. These materials were distributed to patients in the intervention group after they completed a baseline survey. Women coming into the clinics for routine care were eligible if they were between the ages of 30 and 60 years at the time of enrollment and scheduled for a regular screening Pap test but were excluded if they had an abnormal Pap test in the past year, a history of cervical cancer, or a hysterectomy. This study was approved by CDC's Institutional Review Board, and informed consent was obtained from study participants.

Surveys

A baseline survey was completed during 2009-2011 by 984 women aged 30 to 60 years who were receiving a regular screening Pap test. Eligible patients were identified through medical chart review by clinic staff and were invited to participate when they arrived at the clinic for their visit. No records were kept on those who refused participation; thus, we could not calculate a response rate for baseline.[6] Baseline questionnaires were self-administered in the clinic waiting room before each woman's examination and were available in English and Spanish. The survey collected information on demographic characteristics, sources of information about HPV, knowledge and beliefs about HPV, and beliefs about HPV co-testing and longer cervical cancer screening intervals. A follow-up survey was mailed to participating women 15 months after the baseline survey. Of the 984 women who completed the baseline survey, 644 completed the follow-up survey (response rate 65.4%). Patients were offered a $5 cash incentive for participating in each survey. Significant differences between respondents and nonrespondents to the follow-up survey related to age (nonrespondents were younger), race/ethnicity (patients of Hispanic ethnicity were less likely to complete the survey), and insurance coverage (patients with private insurance were more likely to respond than those with no insurance).

Measures

The baseline and follow-up surveys included a skip question that asked participants whether they had ever heard of HPV (response options: "yes" or "no"). Participants who had never heard of HPV were not asked the remaining questions. To assess sources of knowledge about HPV, participants were asked to indicate whether they had heard of HPV from 17 potential sources of health information (Table 1).

HPV knowledge was assessed on the basis of responses to 22 items (Figure 1) after the following statement: "We are interested in your opinions and what you may have heard about HPV." Responses were "agree," "disagree," and "not sure." Women who responded to one or more of the HPV knowledge items but left other items blank were considered to have incorrect knowledge for unanswered items. Women who did not respond to any of the 22 items but answered other questions on the same page and subsequent pages of the survey were considered to have incorrect knowledge to all items. Those who did not respond to any of the HPV knowledge items or the adjacent questions were categorized as having missing responses.

Eight items were used to assess participants' beliefs about HPV co-testing (Table 2). In the baseline survey, these items were prefaced with the statement, "Getting an HPV test with the Pap test *today* …" In the follow-up survey, the statement was reworded to, "Getting an HPV test the *next time* you get a Pap test …" Five items were used to assess participants' beliefs and intentions about extending cervical cancer screening intervals to 3 years, which was the recommendation at the time of the survey (Table 3).

Statistical Analysis

We compared responses from patients who answered the baseline and follow-up surveys. Because we focused on changes in HPV knowledge and beliefs over time, the analytic sample was limited to patients with completed follow-up surveys who reported having heard of HPV at the time of the survey (baseline survey, n = 511; follow-up survey, n = 496). Significance testing of the association of time with knowledge and beliefs was conducted with multilevel, mixed-effects, binary and ordinal logistic regression. Models adjusted for within-person repeated measures and clustering within clinics as random effects. Because participation in the intervention group was not significantly associated with change over time, final models included only the main effect of time. Analyses were conducted in Stata (version 13.1).

Results

A total of 644 women participated in both the baseline and 15-month follow-up survey. The mean age of participants was 46 years; 46% were non-Hispanic white, 27% were Hispanic, and 25% were non-Hispanic black. Of this group, 64.4% (n = 415) were from intervention clinics and 35.6% (n = 229) were from control clinics. Preliminary analyses comparing patients at intervention versus control clinics at baseline revealed no significant differences for any of the following study outcomes: reported sources of information, knowledge about HPV, beliefs about HPV co-testing, or beliefs about longer screening intervals (data not shown). At follow-up, no significant differences in study outcomes were found between the intervention and control groups (data not shown, all P values >.05). For all subsequent analyses, we combined data from patients at the intervention and control clinics and focused on describing changes in all patients' knowledge and beliefs from baseline to follow-up. At baseline, 194 women had not heard of HPV; at follow-up, 28.4% (n = 55) of this group had changed to having heard of HPV.

Sources of Information About HPV

Among patients who reported in the baseline survey that they had ever heard about HPV, the most common sources of information included television (68%), magazines, (42%), health care providers (41%), and pamphlets (33%) (Table 1). At follow-up, the percentage of patients reporting health care providers (50%), pamphlets (41%), and the Internet (30%) as sources of HPV information increased significantly from baseline. Fewer patients reported television as a source of information in the follow-up survey (59%).

HPV Knowledge and Beliefs

Figure 1 shows participants' knowledge about HPV at baseline and follow-up and significant changes in knowledge over time. At baseline, the highest percentages of correct responses were for the following HPV knowledge items: "HPV is a virus" (72%); "There are types of HPV that cause cervical cancer" (67%); "You can always tell when someone has HPV" (False: 67%); "You can have HPV for a long time without knowing it" (61%). Overall, HPV knowledge improved between baseline and follow-up as reflected by significant increases in the percentage of correct responses for all HPV knowledge items ($P < .05$) except "HPV may go away by itself."

Beliefs About Co-Testing and Screening Intervals With the Pap Test

At baseline, participants reported that getting the HPV co-test was good (85%) or wise (92%), will give you peace of mind (Agree: 91%), will tell you whether you need to worry if Pap is abnormal (Agree: 80%), is something your doctor thinks you should have (Agree: 70%), and will give you the best care available (Agree: 91%) (Table 2). However, at follow-up, fewer participants reported that getting the HPV co-test was good (78%, $P = .003$) or wise (86%, $P = .002$), will give you peace of mind (84%, $P < .001$), will tell you whether you need to worry if Pap is abnormal (71%, $P = .001$), is something your doctor thinks you should have (54%, $P < .001$), and will give you the best care available (82%, $P < .001$). For all attitude items, "neither/not sure" responses increased.

Table 3 presents participants' beliefs about extending the cervical cancer screening interval to 3 years with the Pap test if recommended by their provider. At baseline, many participants reported that it would be bad (53%), useless (53%), or worrying (62%). At follow-up, the percentage of patients reporting that the extended interval would be bad (63%, $P < .001$), useless (60%, $P = .010$), or worrying (66%; $P = .027$) increased.

Discussion

We hypothesized that low-income women in our study who received an educational pamphlet and HPV co-testing would report improved knowledge about HPV and positive beliefs about co-testing and longer screening intervals. The major findings from this study are (*a*) there were no differences in knowledge, attitudes or beliefs between the 2 study groups; (*b*) among all women, knowledge of HPV improved between baseline and follow-up; and (*c*) among all women, beliefs about the use of the HPV co-test as a screening strategy and the extension of screening intervals to 3 years with a Pap test were less favorable at follow-up compared with baseline.

In this study population, low knowledge and awareness about cervical cancer screening was associated with higher resistance to longer cervical cancer screening intervals.[6] The pamphlet, given to patients at designated intervention sites, included extensive information on cervical cancer, cervical cancer screening tests and intervals, and HPV. These materials were delivered with the intention of raising awareness of the safety and benefits of HPV co-testing and longer screening intervals, thereby improving knowledge to facilitate changes in attitudes and beliefs. There are multiple possible explanations why the pamphlet used in the

study was not successful in changing attitudes and beliefs. While the Community Guide recommends small media and one-on-one education as effective strategies for increasing cervical cancer screening,[15,16] the Community Guide has not examined these strategies in changing knowledge and attitudes for longer screening intervals. Regarding the intervention delivery, intervention participants were told to review the pamphlet on their own, and no checks were in place to determine whether they read or understood the content. Moreover, providers at control sites may have given patients additional information or resources on HPV testing and cervical cancer, inadvertently affecting the results. The extent to which patients reported that they had learned about HPV from pamphlets and health care providers increased from baseline to follow-up for both groups, supporting this theory. Apart from the intervention delivery, the lack of significance between the 2 study groups may also be related to the content and exposure time. One pamphlet or educational material may not be sufficient, and education may need to be delivered over a longer period of time, as opposed to a one-time exposure. Results from this study make it clear that effective cervical cancer screening interventions are needed to not only increase screening uptake,[17] but to increase awareness and knowledge, address perceptions, and promote adherence to screening guidelines,[18] and additional research is needed to understand the essential core components of educational interventions[19,20] targeting screening attitudes and beliefs among low-income and medically underserved women.

One positive outcome from this study was the reported overall improvements in HPV knowledge among all women, such as HPV can cause cervical cancer and is sexually transmitted. However, our analysis found that among women in both the intervention and control groups, many of the beliefs about the co-test and longer intervals assessed in the surveys worsened over time. This finding is particularly surprising, and could be an unintended consequence of the intervention and messaging. The desire for more frequent care[9] and a high degree of worry, and overestimation of risk for cervical cancer[6,9,12,21] are real concerns for women and may be driving preferences for more-frequent screening. Recommendations for longer screening intervals and frequent changes in recommendations could be particularly disconcerting for women who perceive themselves to be at higher risk of cancer. Education does improve knowledge, but alone does not necessarily allay fears of cervical cancer[22] or increase willingness to extend screening intervals,[7] as results of our study demonstrate. The intervention was not significant in changing attitudes and beliefs, and some beliefs actually worsened. As such, health care providers have a key role in clearly communicating individual risk and the natural history of HPV and cervical cancer, as well as the potential harms of excessive screening, which may help reduce their patients' anxiety and increase acceptance of and adherence to longer intervals.[21,23] At baseline, only 11% of women reported previously receiving guidance from their providers to return for a routine Pap test in 2 or 3 years, and the recommendation actually received by most of the women in our study had been to undergo annual Pap testing. It has been well established that physician recommendation is an important influence on patient behavior; without change to the provider's screening intervals recommendations, significant change in Pap testing practices and attitudes are unlikely.[6]

Strengths and Limitations

Clinics that participated in the study are not necessarily representative of all FQHCs in Illinois, thus, our results may not be generalizable. Regarding delivery of the educational intervention, we did not measure whether patients in the intervention group were actually exposed to the educational pamphlet or whether patients in the control group may have received the pamphlet or other materials from their providers. At follow-up, 41% of patients in the intervention group and 42% of those in the control group reported pamphlets as a source of HPV information. In addition, the population served by FQHCs may have low health literacy affecting their ability to understand patient education materials.[24] Also, patients in both the intervention and control groups received HPV tests during routine screening. Receiving the HPV test may have constituted an intervention of its own, contributing to the increase in knowledge. However, because our study did not include a sample of women who did not receive the HPV test at baseline, we cannot measure the effect of the test on knowledge outcomes. Finally, exposure to the baseline survey that included HPV and cervical cancer-related content may have affected follow-up survey responses.

In summary, there were no significant differences in knowledge, attitudes, and beliefs between the intervention and control groups. HPV knowledge and beliefs of the medically underserved women in this study improved over time, however, resistance to the HPV co-test and longer screening intervals persisted through the study, and beliefs about co-testing and longer intervals worsened over time. Findings from our intervention study highlight that HPV and cervical cancer screening are complex topics, and require intensive intervention methods, especially among medically underserved women. Whether women in FQHCs are being screened too frequently, or are rarely or never screened, appropriate implementation of screening according to guidelines would increase the quality of cervical cancer prevention services for all women, including those at-risk for developing cervical cancer. To achieve appropriate screening, interventions will need to target not only provider and patient attitudes and beliefs, but larger systems barriers to ensure equitable distribution of cervical cancer screening resources.

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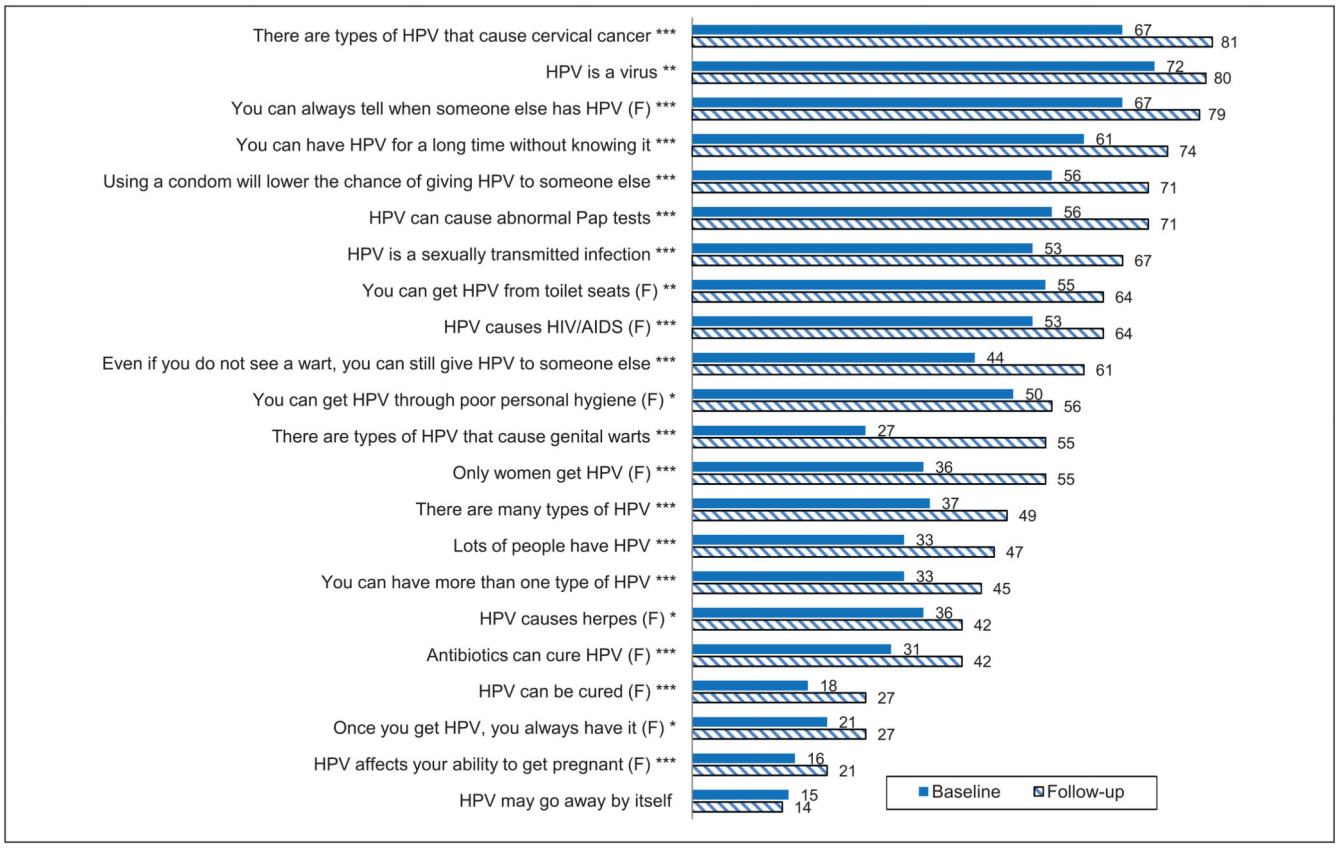

Figure 1.

Percentage of study participants who responded to human papillomavirus (HPV) knowledge items correctly, baseline and 15-month follow-up survey. Study was conducted in 15 Federally Qualified Health Center clinics in Illinois, USA. Baseline surveys were conducted during 2009-2011; follow-up surveys were conducted during 2011-2012.Note. (F) = item is false; correct response was “disagree.” P values were calculated with multilevel, mixed-effects, binary logistic regression models and adjusted for repeated measures of patients and clustering within clinics as random effects. Sample includes patients who had ever heard of HPV. Baseline survey, n = 480; follow-up survey, n = 486. Significant differences by survey: ***$P < .001$; **$P < .01$; *$P < .05$.

Table 1

Participant Responses to Sources of Human Papillomavirus (HPV) Information, Baseline and 15-Month Follow-up Surveys.[a]

Source of HPV Information[b] (Percentage "Yes" Responses)	Baseline (n = 483)		Follow-up (n = 493)		
	%	n	%	n	*P*[c]
Television	68	330	59	290	<.001
Magazines	42	201	40	196	.603
Health care provider	41	196	50	245	.002
Pamphlets	33	159	41	204	.003
Internet	25	123	30	146	.032
Health department	24	115	26	130	.205
Friends	23	111	26	128	.157
Family	21	103	23	111	.781
Radio	19	91	17	84	.505
Medical books/medical journals	17	83	16	80	.603
Family planning clinics	12	58	12	57	.875
Books	12	57	11	52	.446
Coworkers	11	52	11	56	.640
Planned Parenthood	5	25	5	24	.756
Partner	4	19	3	17	.623
Teacher	3	16	3	13	.480
Telephone hotline	1	3	1	3	.985

[a] Study was conducted in 15 Federally Qualified Health Center clinics in Illinois, USA. Baseline surveys were conducted during 2009-2011; follow-up surveys were conducted during 2011-2012.

[b] Sample of patients who had ever heard of HPV.

[c] *P* values were calculated with multilevel, mixed effects, binary logistic regression models and adjusted for repeated measures of patients and clustering within clinics as random effects.

Table 2

Participant Responses to Statements About the Human Papillomavirus (HPV) Co-Test, Baseline and 15-Month Follow-up Surveys.[a]

Baseline Statement: "Getting an HPV with Pap test today …" / Follow-up statement: "Getting an HPV test the next time you get a Pap test …"[b]		Baseline (n = 511)		Follow-up (n = 496)		Ordinal and Binary Logistic Regression[c]	
		%	n	%	n	OR	*P*
Good or bad	Bad	0	1	1	5	0.55	.003[d]
	Neither	15	70	21	100		
	Good	85	409	78	380		
Useful or useless	Useless	24	116	21	101	0.94	.723
	Neither	5	22	11	54		
	Useful	71	337	68	328		
Comforting or worrying	Worrying	11	55	9	42	1.19	.279
	Neither	23	111	25	121		
	Comforting	66	316	67	324		
Wise or foolish	Foolish	0	2	2	11	0.48	.002[e]
	Neither	8	37	12	58		
	Wise	92	437	86	415		
Will give you peace of mind	Disagree	1	3	3	16	0.38	<.001[f]
	Neither/Not sure	8	39	13	61		
	Agree	91	442	84	410		
Will tell you whether you need to worry if Pap is abnormal	Disagree	4	19	9	42	0.54	.001
	Neither/Not sure	16	77	20	95		
	Agree	80	374	71	341		
Is something doctor thinks you should have	Disagree	5	25	10	50	0.41	<.001
	Neither/Not sure	25	117	36	172		
	Agree	70	325	54	260		
Will give you the best care available	Disagree	1	5	3	16	0.29	<.001
	Neither/Not sure	8	37	15	73		
	Agree	91	431	82	394		

[a] Study was conducted in 15 Federally Qualified Health Center clinics in Illinois, USA. Baseline surveys were conducted during 2009-2011; follow-up surveys were conducted during 2011-2012.

[b] Sample of patients who ever heard of HPV.

[c] *P* values were calculated with multilevel, mixed-effects regression models and adjusted for repeated measures and clustering within clinics as random effects. Models were run with ordinal logistic regression except where noted.

[d] Options "Bad" and "Neither" were combined and tested with binary logistic regression.

[e] Options "Foolish" and "Neither" were combined and tested with binary logistic regression.

[f] Options "Disagree" and "Neither" were combined and tested with binary logistic regression.

Table 3

Participant Responses to Questions About Extending the Screening Interval to 3 Years With the Pap Test, Baseline and 15-Month Follow-up Surveys.[a,b]

		Baseline (n = 511)		Follow-up (n = 496)		Ordinal and Binary Logistic Regression[c]	
		%	n	%	n	OR	*P*
If your health care provider recommends that you have your next Pap test in 3 years, how likely are you to wait that long?	Unlikely	58	277	58	284	1.03	.822
	Neither	8	36	6	27		
	Likely	34	164	36	177		
How good or bad would it be to wait 3 years for your next Pap test if that is what your health care provider recommends that you do?	Bad	53	256	63	308	0.57	<.001
	Neither	15	73	13	62		
	Good	32	154	24	120		
How useless or useful would it be to wait 3 years for your next Pap?	Useless	53	251	60	290	0.69	.010
	Neither	21	98	20	98		
	Useful	27	12	20	99		
How comforting or worrying would it be to wait 3 years for your next Pap?	Worrying	62	298	66	325	0.71	.027
	Neither	18	86	18	90		
	Comforting	20	97	15	74		
How wise or foolish would it be to wait 3 years for your next Pap?	Foolish	63	301	67	327	0.80	.124
	Neither	19	91	19	92		
	Wise	18	87	15	72		

[a] Study was conducted in 15 Federally Qualified Health Center clinics in Illinois, USA. Baseline surveys were conducted in 2009-2011, follow-up surveys were conducted 2011-2012.

[b] sample of patients who completed follow-up survey and ever heard of HPV.

[c] Multilevel mixed effects modeling with ordinal logistic models adjusting for within person repeated measures and clustering within clinic as random effects.